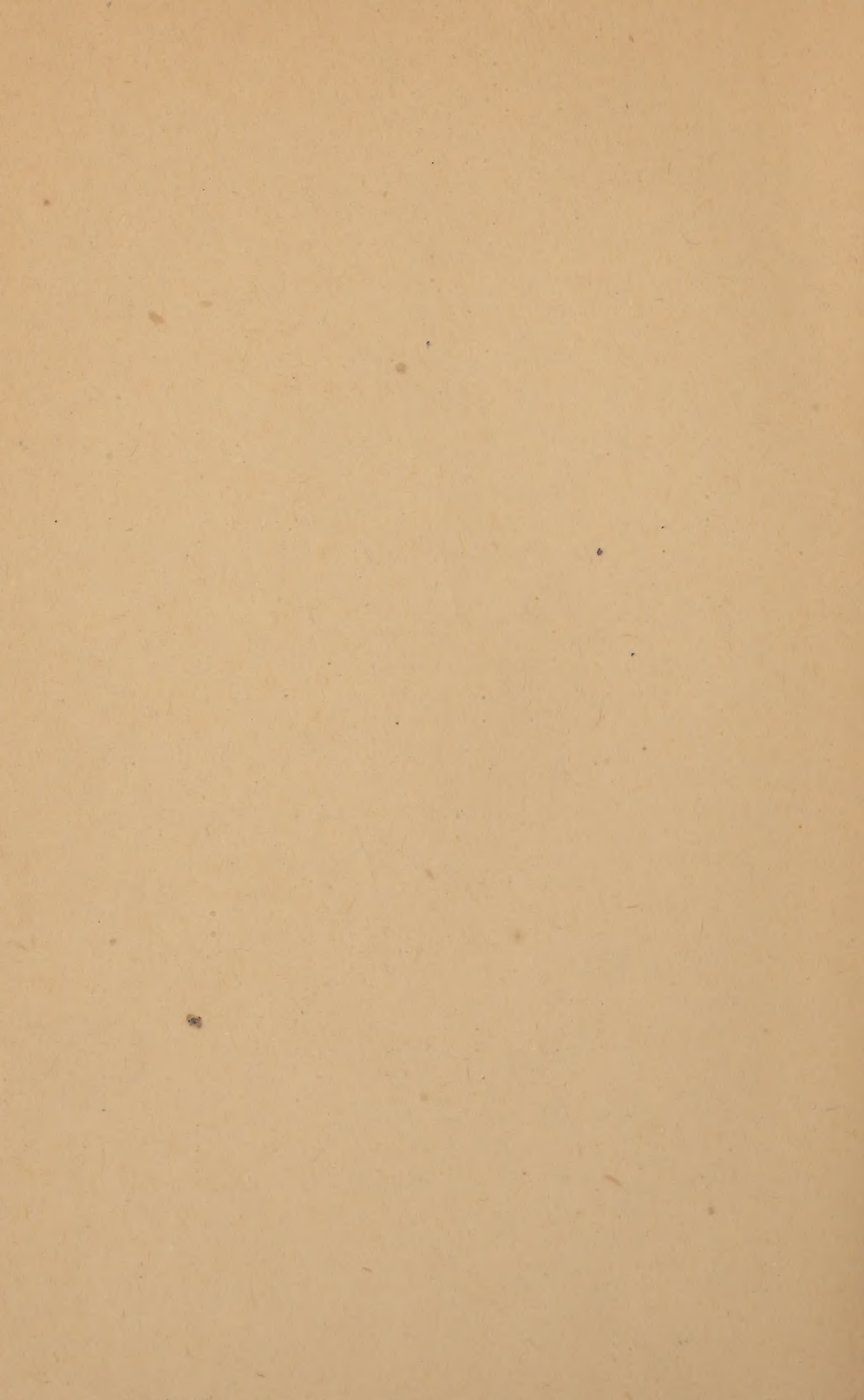


THAYER (W<sup>m</sup> H.)

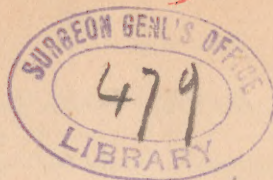
Errors in Ventilation  
No. 2

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Thayer (W<sup>m</sup> H.)



## ERRORS IN VENTILATION.—NO. 2.

By WILLIAM HENRY THAYER, M.D., Brooklyn, N. Y.

I HAVE received many communications from different parts of the country, almost all expressing approval of the statements in the paper on "Errors in Ventilation" in the April number of THE SANITARIAN, and gratification that public attention was called to the subject.

Only three of my correspondents are inclined, for various reasons, to favor the withdrawal of used-up air from the lower part of the room. One of them writes: ". . . In winter the air supplied to the school-room must be warm. Heated air diffuses slowly, rising immediately to the ceiling when introduced into the room. If your exhausts are at the ceiling, this volume of warm fresh air will be lost, and the coldest air will remain in the room. Under such conditions, how will you warm the room?"

To him I replied: "I have never discovered in any rooms that had the escape for foul air in the upper part of the room any of the difficulty you suggest. If the inlets for warm air in or near the floor are large enough to admit a great volume at a temperature not many degrees above blood-heat—as they should be—the room is thoroughly and equally warmed. The hall of the Brooklyn Institute, which I gave as a good example, was faultless in its atmosphere in regard to temperature and purity. The inlets and outlets should be properly proportioned in size, and the results will be agreeable. If all the air admitted to the room is warmed, there will be no cold residuum for the lower part of it."

To another correspondent, who, agreeing with the principles I had advocated, still thought that public rooms might be successfully ventilated by outlets near the floor, I wrote: "I think we should agree about the necessities in the ventilation of buildings—that there must be an ample supply of pure air from the outside, forced or made sure, and a free passage



outward for the foul air. If the outward passage is in the ceiling, the foul air will not need artificial aid for its escape. If the place of exit is near the floor, a motive power will be needed to carry it off; and the room may be perfectly ventilated in that way, if the motive power is of adequate force, and the supply of pure air admitted in sufficient quantity. But I do not understand the object of carrying off the foul air at the level of the floor. What is gained over ventilation through the ceiling? It cannot be claimed that you save more heat; for if the outward current is strong enough to purify the room, there will be as great a discharge of warm air at the lower openings, as if it passed out through the ceiling without artificial aid.

“I think the erroneous belief that the air which is surcharged with carbon dioxide falls to the floor, and produces an excess of the dioxide there, still lingers in the minds of those who propose to ventilate from the lower part of the room.”

The third correspondent, an eminent sanitarian, writes that he prefers ventilation near the floor, to insure the carrying off of disease germs. He evidently believes that the germs of specific diseases settle to the floor by their weight. To allow these microscopic objects, almost imponderable, to be deposited on the floor or in the lower part of the room, is to suppose the entire absence of all atmospheric currents—to imagine rooms totally devoid of all opportunities for ventilation. With proper inlets and outlets, all germs of disease would be thoroughly removed, and have no opportunity to settle to the floor; and, removed into the pure outer air, they do not multiply, but die. Oxygen, as all physicians know, is a perfect disinfectant.

A personal experience in 1863, in Washington, D. C., is strikingly illustrative of the complete removal and disinfection of the germs of a specific disease by free ventilation. My regimental hospital in Gales's Woods was composed of three hospital tents, pitched together so as to make one tent 48 feet in length, and accommodating 24 patients. It was raised upon a skeleton frame, and with a board floor 18 inches above the ground. During the summer the canvas sides were rolled up completely, and never lowered, so that the tent was entirely open all around. In June a patient with diphtheria was

brought in, and from that time till winter there was no time when there was not at least one case of this disease in the hospital—there being twelve cases there during five months. The beds were all occupied with sick men, but no one in the hospital contracted the disease. In November, the onset of cold weather obliged us to let down the sides of the tent. In the course of the month the disease attacked a number of the patients in the hospital, making it necessary to remove to general hospital all those who had already escaped the infection, and admit no more. But for five months, in out-door air, the diphtheric and other patients had lain in contiguous beds, not two feet apart, without a single case of infection within the tent. This complete ventilation proved a perfect disinfectant—as has been shown in many other instances, but never more convincingly than in this case.

Since the publication of the April number of *THE SANITARIAN*, I have examined the warming and ventilating arrangements in St. Ann's Church, in Brooklyn, of whose atmosphere Dr. Bartley made an analysis. I went there just before a forenoon service, when the house might be expected to have the best atmosphere. The air was offensive to the sense of smell, as if it had been at the close of service, in a crowded house without ventilation.

On investigation, it appeared that no air was admitted to the building, except what might enter while the doors were open. I was informed that there were flues for admitting fresh air at the east end. I looked for the openings of these fresh-air flues on the outside of the church, and found four openings near the ground, each about twelve inches square; but they were all carefully closed, by Canton flannel nailed over them! I discovered that the flues from these openings extended to the risers of the chancel steps, with openings there; so that, before they were closed, strong currents of cold air were doubtless discharged in the faces of the occupants of the front pews. The air was evidently shut off as a nuisance, by covering the openings on the outside.

The excessive foulness of the air was thus accounted for; the outlet flues carry little off, for there is no fresh air to take its place, except what enters while the church-doors are open. We cannot draw air out of a room if we do not provide an



inlet for a new supply. I went into the tower—which, by the way, is heated by steam pipes and not by gas, as stated incorrectly in my April paper—and found no current flowing out of the great ventilating pipe that opens from the church. How could there be an outward current, if no air entered the building from the outside? It is not strange that its atmosphere, as analyzed by Dr. Bartley, was fouler than that of any of the numerous halls examined by Dr. R. C. Stiles in 1869. The strange and sad part of it, is, that a congregation could endure this state of things for twenty years, without complaint or investigation. One cannot easily overestimate the criminality of such arrangements, inevitably undermining the health of so many people.

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